POOR LEGIBILITY

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SAFETY AND SECURITY DIVISION
333 N. MICHIGAN AVENUE
CHICAGO 1, ILLINOIS 16 December 1944

Subject: Health Hazards from Solvents and Their Control

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Cleaning. These operations are usually of two types, - scattered spot cleaning which is frequently intermittent, and routine production cleaning.

a. Scattered spot cleaning seldom requires local exhaust ventilation to prevent excessive exposure of the workers to the solvent vapors. Sometimes, however, local exhaust ventilation can be used to advantage to prevent excessive heat loss by keeping the rate of air removal at a minimum; - local exhaust ventilation requires less air removal than general ventilation. Operations such as type cleaning and equipment or machine cleaning may subject the operator to high concentrations of the vapor for short periods even in well ventilated bays or buildings. However, the duration of such exposures is usually short enough to prevent poisoning of the operators, and suitable respirators (gas masks or chemical cartridge respirators) may be worn to protect the workers. Where considerable spot cleaning is done in scattered locations in a building the solvent should be kept in small covered containers and the cloths or brushes likewise should be stored in closed containers when not in use. Suitable solvent containers with spring supported screens for the applicators are available for such operations. The minimum required general ventilation rate for spot cleaning operations may be computed by means of the following equation:

$$Q = \frac{1.2 \times 10^6 \times S}{m.w. \times m.a.c.}$$

in which Q represents the ventilation rate in cubic feet per minute.

S represents the amount of solvent used per minute in grams (obtained by multiplying volume in cc by specific gravity)

m.w. represents molecular weight of solvent.

m.a.c. represents the maximum allowable concentration for the solvent.

(For solvents composed of several ingredients use the m.a.c. of the most toxic. See list of m.a.c.'s for some common solvents in paragraph 9).

b. Routine production cleaning operations as a rule require local exhaust ventilation to control the health hazard adequately. This does not mean that such hazards cannot be controlled by adeqaute and proper general ventilation such as "spot blowing". However, the ventilation rate, and consequently the heating load, is lower with good local exhaust ventilation. With local exhaust ventilation the concentrated vapors are prevented from entering the general room atmosphere by being drawn into the exhaust hood, whereas with general ventilation the solvent vapor concentration is merely kept below the harmful level by dilution with uncontaminated

(Over)

outside air. The health hazard associated with cleaning operations on work benches may be controlled conveniently by means of down draft or lateral exhaust ventilation. Downdraft is preferred since the required ventilation rate is usually lower than that with lateral exhaust hoods. For downdraft ventilation the work bench is provided with suitable grilles or grids which underlie all the sources or locations of vapor release. Air is drawn through the grilles at the minimum rate of 150 cfm per square foot of grill area. Lateral exhaust ventilation is provided by installing slot type hoods at the far side (or in the center) of the work bench. The slots should be 2 to 4 inches wide and the hoods should extend the entire length of the line where cleaning operations are being conducted. A 6 to 12 inch high flange on the hood will improve the control considerably. If a flange can be used the required ventilation rate may be determined by:

$$Q = 150\ LW$$

Where Q represents the ventilation rate in cubic feet per minute

L represents the length in feet of the line where cleaning is done

W represents the distance in feet from hood to the remotest point of vapor release.

If flanges cannot be used the ventilation rate should be $Q = 200\ LW$. Lateral exhaust ventilation is also recommended for cleaning operations on conveyor belts or at conveyor lines.

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Substance	M.A.C.*	
Acetone	400 to 500	p.p.m.**
Amyl acetate	400	"
Amyl alcohol	400	"
Benzene (Benzol)	50 to 100	"
Butyl acetate	400	"
Butyl alcohol	200	"
Carbon disulfide	20	"
Carbon tetrachloride	50 to 100	"
Dichlorethylene	100	"
Ethyl acetate	400	"
Ethyl alcohol	200	"
Ethylene dichloride	100	"
Gasoline (Benzine)	1000	"
Hexanone	1000	"
Methyl acetate	400	"
Methyl alcohol	200	"
Naphtha (Petroleum)	1000	"
Propyl acetate	400	"
Tetrachlorethane	10	"
Tetrachlorethylene (Perchlorethylene)	200	"
Toluene (Toluol)	200	"
Trichlorethylene	200	"
Turpentine	200	"
Xylene (Xylol)	200	"

* Maximum allowable atmospheric concentration on the basis of eight hours daily exposure.

** Parts of substance per million parts of air by volume.